

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 879 145 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
19.01.2000 Bulletin 2000/03

(51) Int Cl.⁷: **B41F 15/08**

(86) International application number:
PCT/NL96/00181

(21) Application number: **96911117.8**

(87) International publication number:
WO 96/34750 (07.11.1996 Gazette 1996/49)

(22) Date of filing: **24.04.1996**

(54) **ROTARY SCREEN PRINTING MACHINE**

ROTATIONSSIEBDRUCKMASCHINE

MACHINE D'IMPRESSION SERIGRAPHIQUE ROTATIVE

(84) Designated Contracting States:
**AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC
NL PT SE**

(72) Inventor: **DERKS, Marius, Joseph**
NL-5445 AD Landhorst (NL)

(30) Priority: **04.05.1995 NL 1000306**

(74) Representative:
Iemenschot, Johannes Andreas, Ir. et al
van Exter Polak & Charlouis B.V.,
P.O. Box 3241
2280 GE Rijswijk (NL)

(43) Date of publication of application:
25.11.1998 Bulletin 1998/48

(73) Proprietor: **STORK SCREENS B.V.**
5831 AT Boxmeer (NL)

(56) References cited:
EP-A- 0 095 423 **FR-A- 2 058 635**
FR-A- 2 213 165 **FR-A- 2 420 426**

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 0 879 145 B1

Description

[0001] The invention relates to a rotary screen printing machine for printing web-type or sheet-type material, comprising a main frame on which at least one screen printing unit is mounted, which screen printing unit comprises a stencil, a stencil holder, drive means for rotatable driving of the stencil, a squeegee, a squeegee suspension, a counterpressure roller and a printing paste supply system.

[0002] Rotary screen printing machines of the above-mentioned type are known in practice. The known machines are generally provided with several screen printing units mounted on the main frame, the parts of each screen printing unit generally being mounted on or at the main frame. This means that for carrying out work on certain parts of the screen printing unit, such as the stencil and/or the squeegee, the screen printing unit usually has to be disassembled and subsequently reassembled. This takes a lot of time. Moreover, the disassembly and assembly of the parts gives rise to problems, particularly in the case of broad machines. In the case of certain types of rotary screen printing machines, measures have been taken to facilitate the disassembly and assembly of certain parts, such as the squeegee, but these measures do not give sufficient improvement.

[0003] The object of the invention is to provide a rotary screen printing machine in which the abovementioned disadvantages have been overcome.

[0004] This object is achieved in the case of a rotary screen printing machine of the abovementioned type through the fact that the stencil, the stencil holder, the squeegee, the squeegee suspension and the printing paste supply system are accommodated in a subframe which is movable in the transverse direction relative to the main frame of the printing machine.

[0005] In the case of the rotary screen printing machine according to the invention, the subframe with the parts accommodated therein can be placed as a unit next to the machine, and in this position work can be carried out on the screen printing unit. A considerable gain in time is achieved in this way. Moreover, the parts are readily accessible, so that the work can also be carried out much more easily. This is advantageous in particular if the stencil consists of a cylindrical element with a flat screen fitted around it. Positioning and clamping the flat screen on the cylindrical element is much easier in the case of a slide-out subframe, owing to the easy accessibility. The construction according to the invention also makes it possible for a subframe with parts accommodated therein to be replaced in a short time by another subframe, for example when a pattern or colour is being changed.

[0006] Expedient embodiments of the screen printing machine according to the invention are laid down in the subclaims.

[0007] The invention will now be explained in greater detail in the following description of an exemplary em-

bodiment of a screen printing machine according to the invention with reference to the appended drawings, in which:

Fig. 1 shows very diagrammatically the design of a rotary screen printing machine for printing a continuous textile web;

Fig. 2 shows very diagrammatically the design of a rotary screen printing machine for printing a continuous paper web;

Fig. 3 shows very diagrammatically and in perspective a screen printing unit mounted on the main frame of a rotary screen printing machine according to the invention for printing sheets;

Fig. 4 shows diagrammatically an end part of a screen printing unit of a rotary screen printing machine according to the invention, in which the parts accommodated in the subframe are omitted;

Fig. 5 shows a diagrammatic view of the screen printing unit shown in Fig. 4, viewed from the side of the rotary screen printing machine;

Fig. 6 shows a view in the direction of the arrow VI in Fig. 5, in the working position of the screen printing unit;

Fig. 7 shows a view such as that of Fig. 6, in which the subframe has been raised;

Fig. 8 shows a view such as that of Fig. 6, in which the subframe is situated next to the rotary screen printing machine;

Fig. 9 shows diagrammatically a particular embodiment of a stencil of the rotary screen printing machine.

[0008] A rotary screen printing machine, which is shown very diagrammatically in Fig. 1, comprises in general a main frame 1, on which one or more screen printing units 2 are mounted. A continuous material web 3 for printing is unwound from a roll 4 and then passed through a web supply station 5 and the screen printing units 2. After printing, the web is passed through a drier 6 and an output station 7, and is then wound onto a roll 8. During printing in a screen printing unit 2, the material web 3 is passed through between a stencil 9 and a rubber blanket 12 which is passed around rolls 10 and 11, the rubber blanket being supported at the position of the stencil 9 by a counterpressure roller 13. A rotary screen printing machine of the type shown very diagrammatically in Fig. 1 is intended for printing a continuous textile web. Such a rotary screen printing machine is generally known and requires no further explanation.

[0009] Fig. 2 shows very diagrammatically a rotary screen printing machine for printing a continuous paper web 3. As regards the general design, this machine corresponds largely to the screen printing machine shown in Fig. 1. Similar parts are therefore indicated by the same reference numbers. The difference lies in the slightly different arrangement of the screen printing units 2 and the absence of a rubber blanket 12. Such a rotary

screen printing machine is also generally known and requires no further explanation.

[0010] Another type of rotary screen printing machine is described in Dutch Patent Application No. 9400494 or European Patent Application No. 93200783.4 (publication number 0,561,474) of Applicants. These applications concern a sheet rotary screen printing machine, in which sheets of material are conveyed and printed individually. The material to be printed is thus not conveyed through the machine in the form of a continuous web (textile web or paper web).

[0011] Fig. 3 shows very diagrammatically a screen printing unit 2 of a rotary screen printing machine according to the invention. In Fig. 3 the screen printing unit is mounted on a rotary screen printing machine for printing sheets. A sheet for printing is indicated by 3'. The screen printing unit 2 comprises in general a stencil 9, a stencil holder 14, a squeegee 15 placed inside the stencil 9, a squeegee suspension (not shown), a counterpressure roller (not shown) and a printing paste supply system 16, consisting of a printing paste tank 17, a paste pump 18 and a printing paste line 19, by means of which line the printing paste is pumped from the tank 17 to the squeegee 15. The screen printing unit 2 is mounted on the main frame 1 of the rotary screen printing machine.

[0012] A screen printing unit 2 for a rotary screen printing machine for printing a continuous textile web (Fig. 1) or a continuous paper web (Fig. 2) will be of essentially the same design.

[0013] The stencil 9 can consist of a cylindrical screen with end rings or a cylindrical element with openings around which an originally flat screen has been fitted.

[0014] At set times it is necessary to remove various parts of a screen printing unit and to refit them. This is the case when cleaning or repair work has to be carried out on the parts, or when a design and/or colour change has to be made, in which case the stencil, the screen and/or the squeegee with printing paste supply system have to be replaced. In order to keep the time required for this as short as possible and make the various parts more readily accessible, in the case of the rotary screen printing machine according to the invention the stencil 9, the stencil holder 14, the squeegee suspension and the printing paste supply system 16 in each screen printing unit are accommodated in a subframe which is movable transversely relative to the main frame 1 of the printing machine.

[0015] Fig. 4, in which an end part of a screen printing unit of a rotary screen printing machine according to the invention is shown diagrammatically, shows the way in which the subframe 21 can be suspended in the main frame. For the sake of simplicity, the various parts accommodated in the subframe are omitted in Fig. 4. In Fig. 4 the subframe is suspended in guide rails 22 and 23 extending in the transverse direction relative to the main frame 1, as a result of which the subframe 21 is movable transversely relative to the main frame 1. The

guide rails 22 and 23 are fixed to guide rail supports 24 and 25 which are movable in the vertical direction relative to the main frame 1. In Fig. 4 the guide rail supports 24 and 25 are movable in the vertical direction by means of vertical threaded rods 26 and 27 which are situated at both ends of the guide rail supports 24 and 25 and extend through threaded holes provided in end pieces 28 and 29 of the guide rail supports. Through rotation of the threaded rods 26 and 27, the guide rail supports 24 and 25, and consequently the subframe, can be moved up and down. The rotation of the threaded rods can occur in various ways which are known to a person skilled in the art.

[0016] Dowel pins 31 and 32, on which the subframe 21 rests when the screen printing unit 2 is in the working position, are fitted on the main frame 1 at both ends of the screen printing unit. These dowel pins ensure that when the screen printing unit 2 is in the working position the subframe 21 is positioned accurately in the screen printing unit. The dowel pins 31 and 32 are preferably adjustable in height, so that the height of the subframe, and consequently the height of the stencil in the screen printing unit can be adapted to the thickness of the material web to be printed.

[0017] Figs. 5 to 8 show the position of the subframe 21 and the stencil 9 when the screen printing unit 2 is in the working position (Figs. 5 and 6), in the raised position (Fig. 7) and in the raised and slid-out position (Fig. 8). In Figs. 5 to 8 the various parts are indicated by the same reference numbers as in Fig. 4.

[0018] When the subframe 21 with the parts accommodated therein is being placed next to the screen printing machine, the procedure is as follows. From the position shown in Figs. 5 and 6, the subframe is moved upwards so far by means of the four vertical threaded rods 26, 27, 27' (two at each end of the subframe) that the subframe 21 can be slid out of the machine, over the counterpressure roller 13 in the direction of the operating side of the machine (see Fig. 7). The subframe is then slid in the lateral direction out of the machine (see Fig. 8), during which time the subframe is guided by the guide rails 22, 23, which are in the form of telescopic guide rails. In the position shown in Fig. 8 work can easily be carried out on the screen printing unit. However, it is also possible to remove the subframe 21 completely from the machine and replace it by another subframe with parts accommodated therein. The procedure is reversed for returning the screen printing unit to the working position, in which case the dowel pins 31 and 32 ensure accurate positioning of the subframe in the screen printing unit.

[0019] The construction described above can be used with particular advantage in a sheet rotary screen printing machine in which the stencil consists of a cylindrical element with openings around which an originally flat screen has been fitted.

[0020] Fig. 9 shows diagrammatically such a stencil 41 with squeegee 42 fitted therein. The stencil 41 con-

sists of a cylindrical element 43 with an originally flat screen fitted around it. The cylindrical element 43 is provided with register pins 44 in the lengthwise direction, and the screen is provided with register holes which match the register pins 44. The screen is provided at the edges with strips made of plastic, such as polyurethane. The screen is positioned on the cylindrical element 43 by means of the register pins and the register holes, and is tensioned by means of dividing tension rings 45, 46, which grip behind the strips fitted on the screen and tension the screen in the axial direction. The plastic strips also prevent tearing of the screen material during coating, patterning and fitting on the cylindrical element 43.

[0021] The screen material used is preferably material with a high modulus of elasticity, preferably with a nickel electroplated base. Such material is subject to little or no stretching during the tensioning of the screen.

[0022] The screen will in general be rectangular and will be provided on all four sides with plastic strips, in order - as stated above - to prevent tearing of the screen material, while at the side where the register holes are located the strip is also provided with register holes.

[0023] The stencil 41 can be driven by way of the helical toothing 46 disposed thereon.

[0024] The fitting (positioning and clamping) and cleaning of the screen can be carried out easily and quickly in the position of the stencil shown in Fig. 8. In this position the drive can remain connected and rotate the cylindrical element slowly during the fitting of the screen, and in this way, as it were, wind the originally flat screen around the cylindrical element.

[0025] It will be clear that a construction with a subframe which is movable in the transverse direction can also be used if another printing forme is used instead of a stencil.

[0026] The screen printing machine according to the invention can contain several screen printing units which may differ from each other and, in addition, can also have other printing units with other printing formes.

Claims

1. Rotary screen printing machine for printing web-type or sheet-type material, comprising a main frame on which at least one screen printing unit is mounted, which screen printing unit comprises a stencil, a stencil holder, drive means for rotatable driving of the stencil, a squeegee, a squeegee suspension, a counterpressure roller and a printing paste supply system, **characterized in that** the stencil, the stencil holder, the squeegee, the squeegee suspension and the printing paste supply system are accommodated in a subframe (21) which is movable in the transverse direction relative to the main frame (1) of the printing machine.
2. Rotary screen printing machine according to claim

1, **characterized in that** the subframe (21) is suspended in guide rails (22, 23) extending in the transverse direction relative to the main frame (1).

3. Rotary screen printing machine according to claim 2, **characterized in that** the guide rails (22, 23) are fixed to guide rail supports (24, 25) which are movable in the vertical direction relative to the main frame (1).
4. Rotary screen printing machine according to claim 3, **characterized in that** the guide rail supports (24, 25) are movable in the vertical direction by means of vertical threaded rods (26, 27).
5. Rotary screen printing machine according to one of claims 1 - 4, **characterized in that** when the screen printing unit (2) is in the working position, the subframe (21) rests on dowel pins (31, 32) which are fitted on the main frame (1).
6. Rotary screen printing machine according to claim 5, **characterized in that** the dowel pins (31, 32) are adjustable in height.
7. Rotary screen printing machine according to one of claims 1 - 6, **characterized in that** the stencil consists of a cylindrical element with an originally flat screen fitted around it.
8. Rotary screen printing machine according to claim 7, **characterized in that** the cylindrical element is provided with register pins in the lengthwise direction.
9. Rotary screen printing machine according to claim 8, **characterized in that** the screen is provided with register holes which match the register pins of the cylindrical element.
10. Rotary screen printing machine according to one of claims 7 - 9, **characterized in that** the screen is provided at the edges with strips made of plastic, for example polyurethane.
11. Rotary screen printing machine according to one of claims 7 - 10, **characterized in that** the screen is made of a material with a high modulus of elasticity, preferably with a nickel electroplated base.

Patentansprüche

1. Rotations-Siebdruckmaschine zum Bedrucken von bahn- oder bogenartigem Material, die ein Hauptgestell umfaßt, an dem wenigstens eine Siebdruckeinheit angebracht ist, wobei die Siebdruckeinheit eine Schablone, einen Schablonenhalter, eine An-

triebseinrichtung, die die Schablone drehend antreibt, eine Rakel, eine Rakelaufhängung, eine Gegendruckwalze und ein Druckpastenzuführsystem umfaßt, **dadurch gekennzeichnet**, daß die Schablone, der Schablonenhalter, die Rakel, die Rakelaufhängung und das Druckpastenzuführsystem in einem Untergestell (21) aufgenommen sind, das in der Richtung quer zu dem Hauptgestell (1) der Druckmaschine bewegt werden kann.

2. Rotations-Siebdruckmaschine nach Anspruch 1 **dadurch gekennzeichnet**, daß das Untergestell (21) in Führungsschienen (22, 23) aufgehängt ist, die quer zu dem Hauptgestell (1) verlaufen.
3. Rotations-Siebdruckmaschine nach Anspruch 2, **dadurch gekennzeichnet**, daß die Führungsschienen (22, 23) an Führungsschienenträgern (24, 25) befestigt sind, die vertikal zu dem Hauptgestell (1) bewegt werden können.
4. Rotations-Siebdruckmaschine nach Anspruch 3, **dadurch gekennzeichnet**, daß die Führungsschienenträger (24, 25) mit vertikalen Gewindestangen (26, 27) vertikal bewegt werden können.
5. Rotations-Siebdruckmaschine nach einem der Ansprüche 1 - 4, **dadurch gekennzeichnet**, daß, wenn sich die Siebdruckeinheit (2) in der Arbeitsposition befindet, das Untergestell (21) auf Führungszapfen (31, 32) aufliegt, die an dem Hauptgestell (1) angebracht sind.
6. Rotations-Siebdruckmaschine nach Anspruch 5, **dadurch gekennzeichnet**, daß die Führungszapfen (31, 32) höhenverstellbar sind.
7. Rotations-Siebdruckmaschine nach einem der Ansprüche 1 - 6, **dadurch gekennzeichnet**, daß die Schablone aus einem zylindrischen Element besteht, um das herum ein ursprünglich flaches Sieb angebracht ist.
8. Rotations-Siebdruckmaschine nach Anspruch 7, **dadurch gekennzeichnet**, daß das zylindrische Element mit Ausrichtzapfen in der Längsrichtung versehen ist.
9. Rotations-Siebdruckmaschine nach Anspruch 8, **dadurch gekennzeichnet**, daß das Sieb mit Ausrichtlöchern versehen ist, die den Ausrichtzapfen des zylindrischen Elementes entsprechen.
10. Rotations-Siebdruckmaschine nach einem der Ansprüche 7 - 9, **dadurch gekennzeichnet**, daß das Sieb an den Rändern mit aus Kunststoff, beispielsweise Polyurethan, bestehenden Streifen versehen ist.

11. Rotations-Siebdruckmaschine nach einem der Ansprüche 7 - 10, **dadurch gekennzeichnet**, daß das Sieb aus einem Material mit einem hohen Elastizitätsmodul, vorzugsweise mit einem mit Nickel elektroplattierten Träger, besteht.

Revendications

1. Machine d'impression sérigraphique rotative pour imprimer un matériau de type bande ou de type feuille, comprenant un bâti principal sur lequel au moins une unité d'impression sérigraphique est montée, laquelle unité d'impression sérigraphique comprend un stencil, un support de stencil, des moyens d'entraînement pour entraîner en rotation le stencil, une raclette, une suspension de raclette, un cylindre à contre-pression et un système d'approvisionnement en pâte d'impression, caractérisée en ce que le stencil, le support de stencil, la raclette, la suspension de raclette et le système d'approvisionnement en pâte d'impression sont logés dans un bâti secondaire (21) qui est mobile dans le sens transversal par rapport au bâti principal (1) de la machine d'impression.
2. Machine d'impression sérigraphique rotative selon la revendication 1, caractérisée en ce que le bâti secondaire (21) est suspendu dans des rails de guidage (22, 23) s'étendant dans le sens transversal par rapport au bâti principal (1).
3. Machine d'impression sérigraphique rotative selon la revendication 2, caractérisée en ce que les rails de guidage (22, 23) sont fixés à des supports de rails de guidage (24, 25) qui sont mobiles dans le sens vertical par rapport au bâti principal (1).
4. Machine d'impression sérigraphique rotative selon la revendication 3, caractérisée en ce que les supports de rails de guidage (24, 25) sont mobiles dans le sens vertical au moyen de tiges filetées verticales (26, 27).
5. Machine d'impression sérigraphique rotative selon l'une quelconque des revendications 1 - 4, caractérisée en ce que, lorsque l'unité d'impression sérigraphique (2) est dans la position de travail, le bâti secondaire (21) repose sur des goujons de guidage (31, 32) qui sont fixés sur le bâti principal (1).
6. Machine d'impression sérigraphique rotative selon la revendication 5, caractérisée en ce que les goujons de guidage (31, 32) sont ajustables en hauteur.
7. Machine d'impression sérigraphique rotative selon l'une quelconque des revendications 1 - 6, caractérisée en ce que le stencil consiste en un élément

cylindrique autour duquel un écran plat à l'origine est ajusté.

8. Machine d'impression sérigraphique rotative selon la revendication 7, caractérisée en ce que l'élément cylindrique est pourvu de broches de repérage dans le sens de la longueur. 5
9. Machine d'impression sérigraphique rotative selon la revendication 8, caractérisée en ce que l'écran est pourvu de trous de repérage qui correspondent aux broches de repérage de l'élément cylindrique. 10
10. Machine d'impression sérigraphique rotative selon l'une quelconque des revendications 7 - 9, caractérisée en ce que l'écran est pourvu aux bords de bandes en plastique, par exemple en polyuréthane. 15
11. Machine d'impression sérigraphique rotative selon l'une quelconque des revendications 7 - 10, caractérisée en ce que l'écran est réalisé en un matériau ayant un module d'élasticité élevé, de préférence avec une base métallisée au nickel. 20

25

30

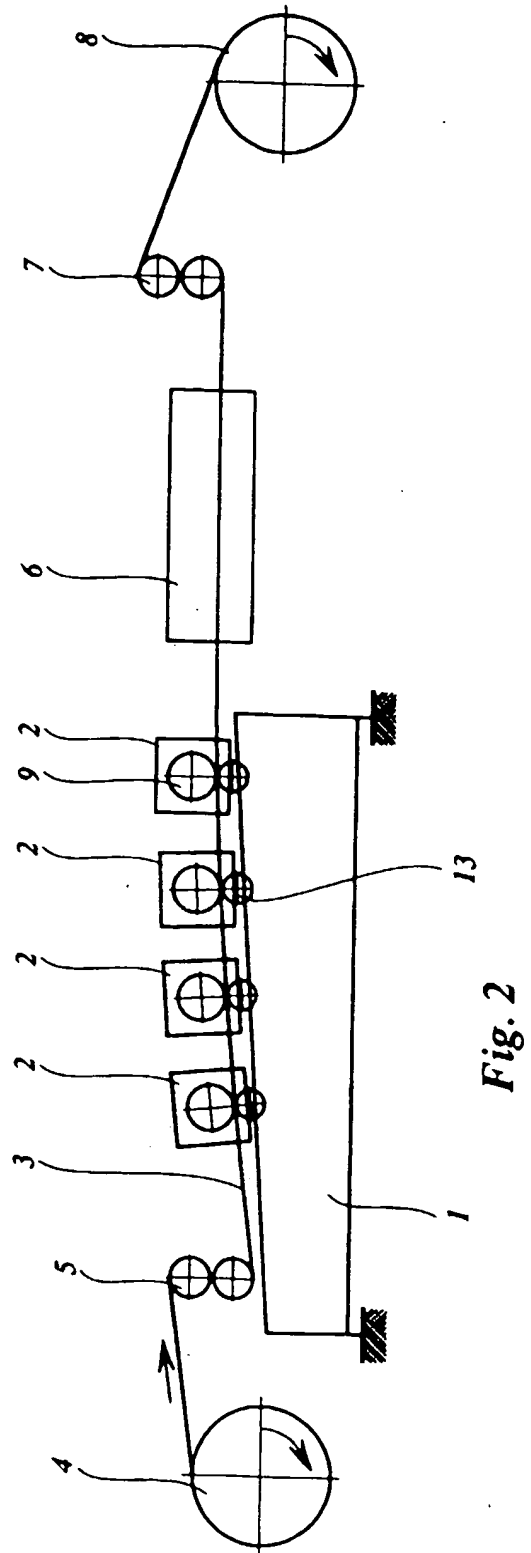
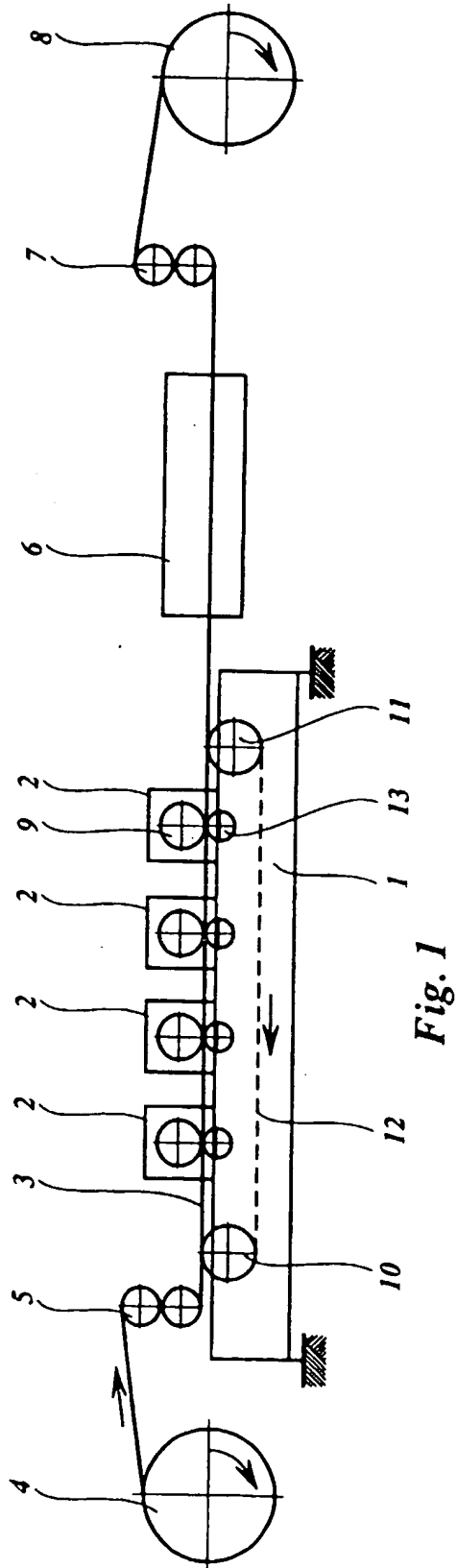
35

40

45

50

55



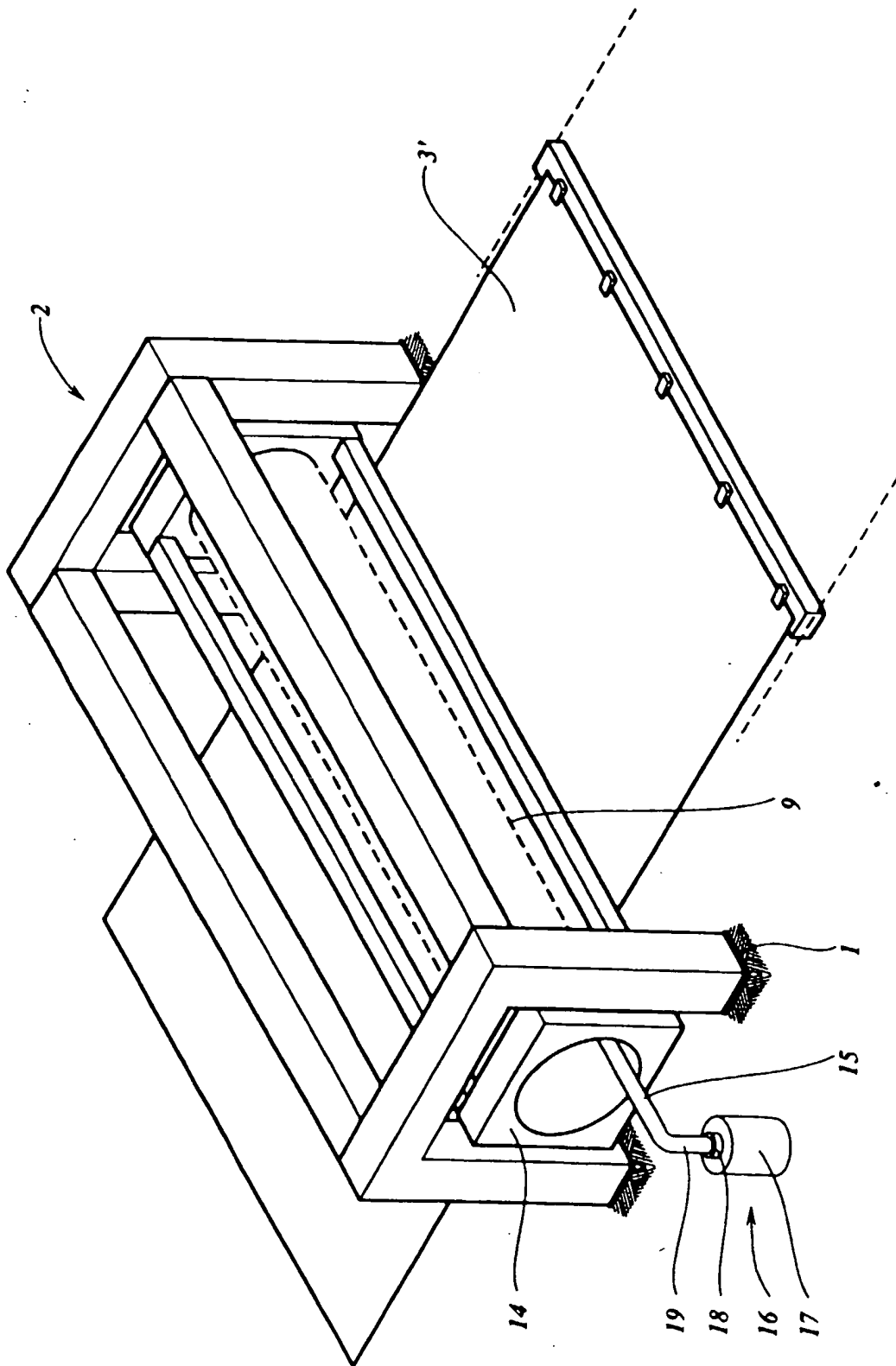
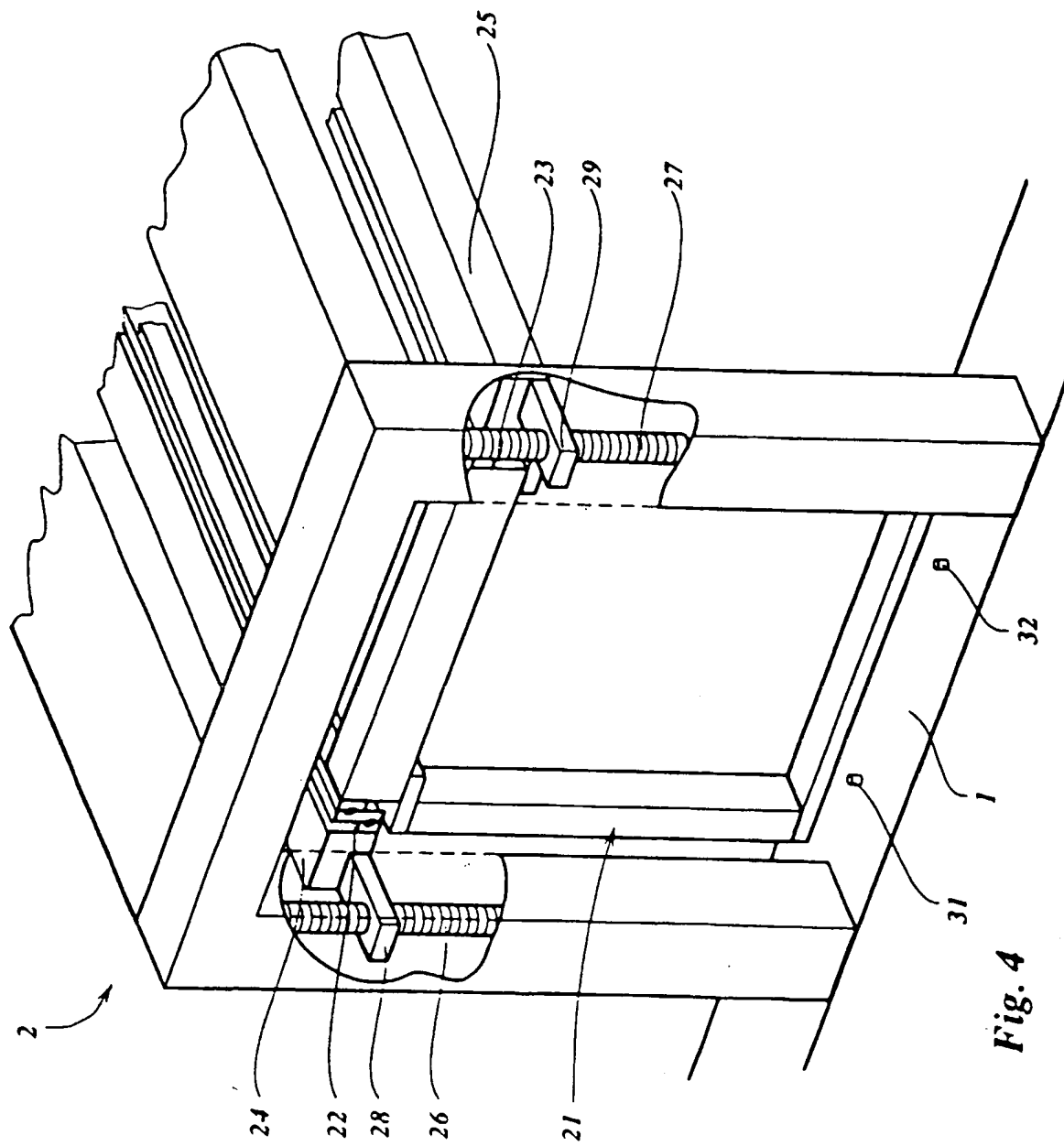


Fig. 3



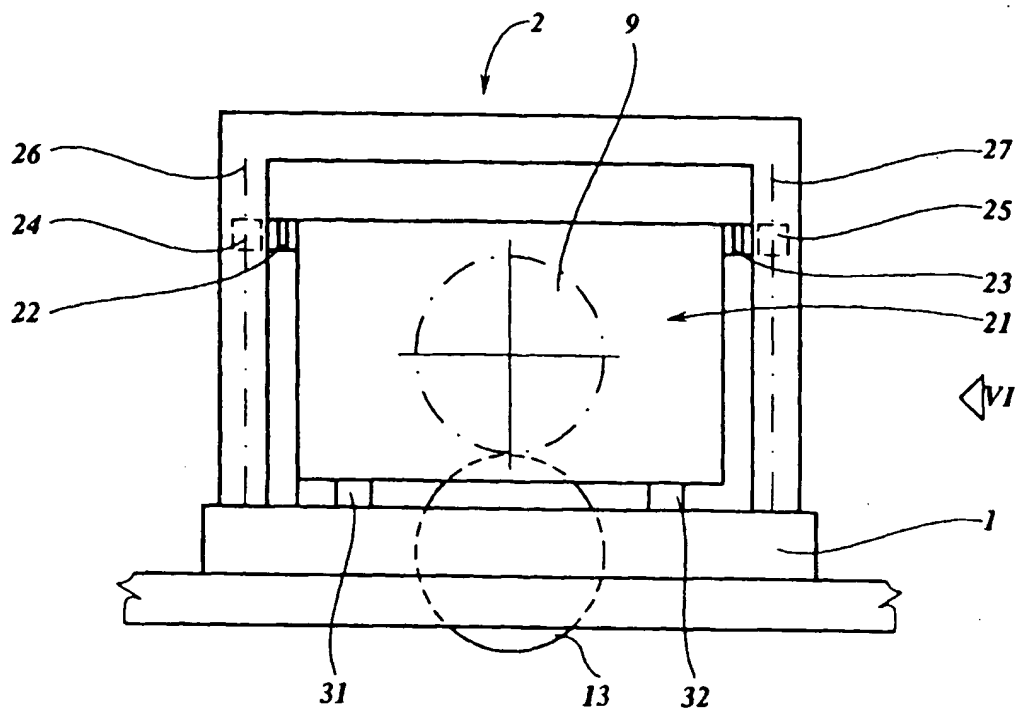


Fig. 5

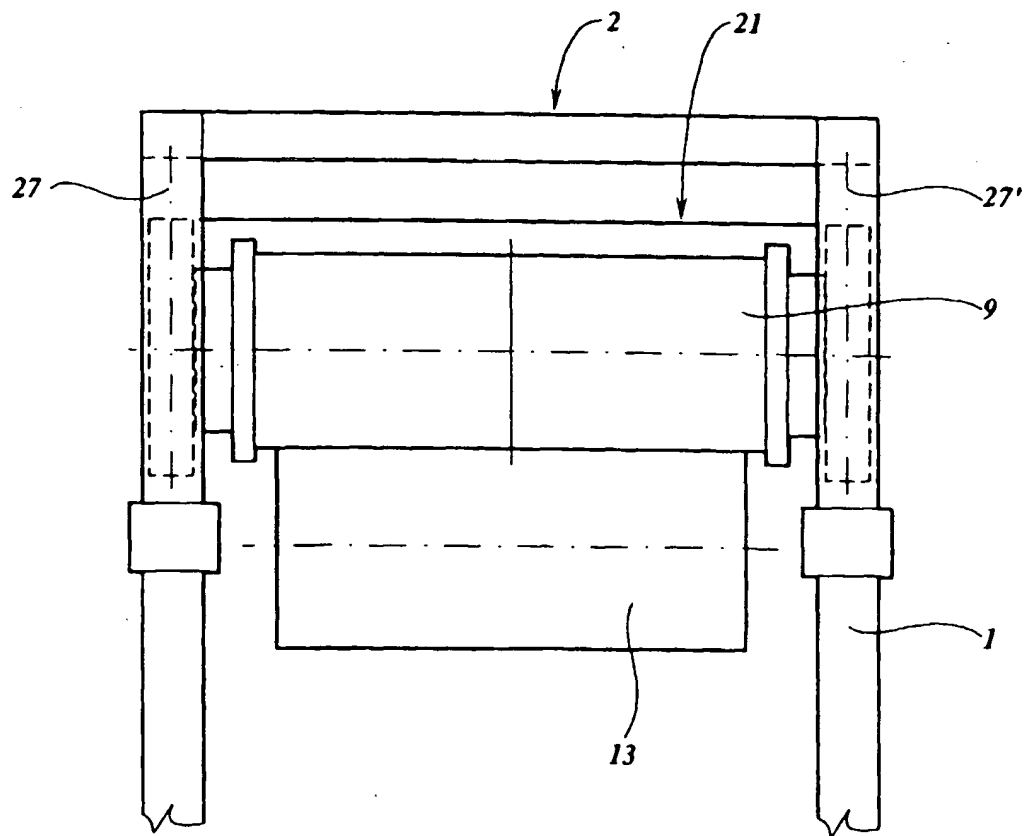


Fig. 6

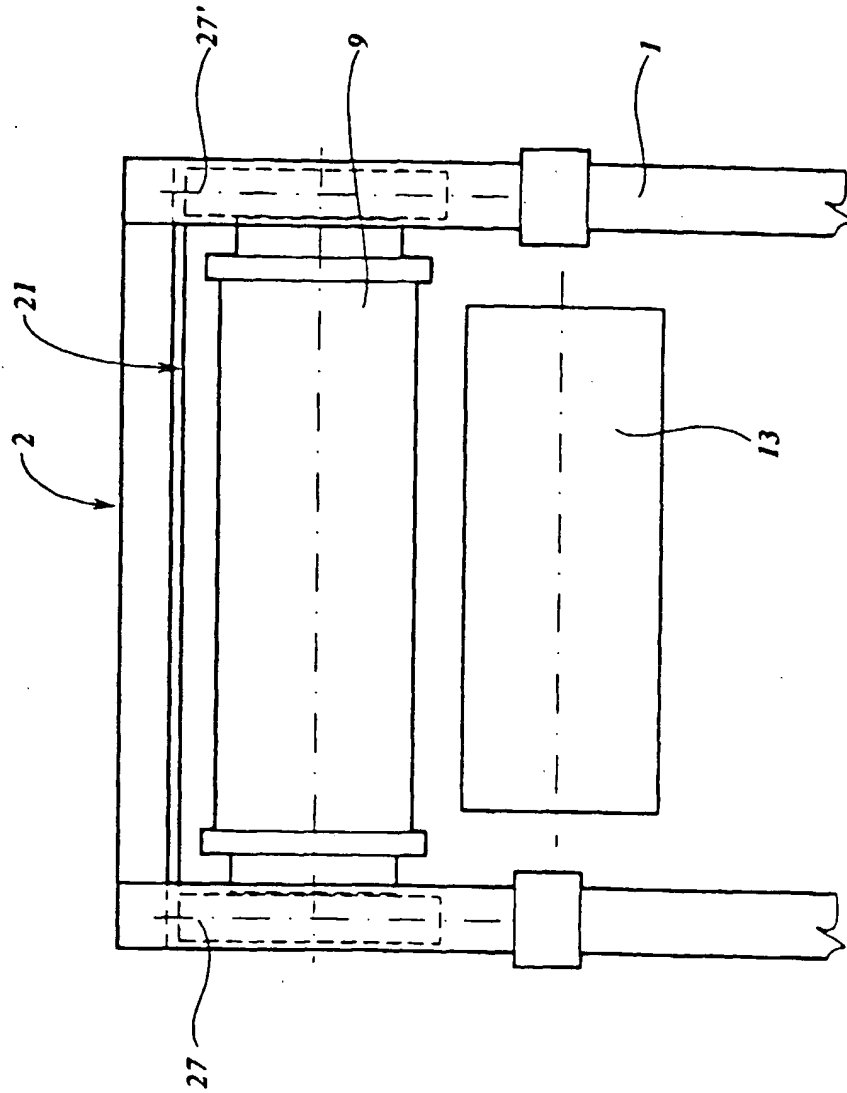


Fig. 7

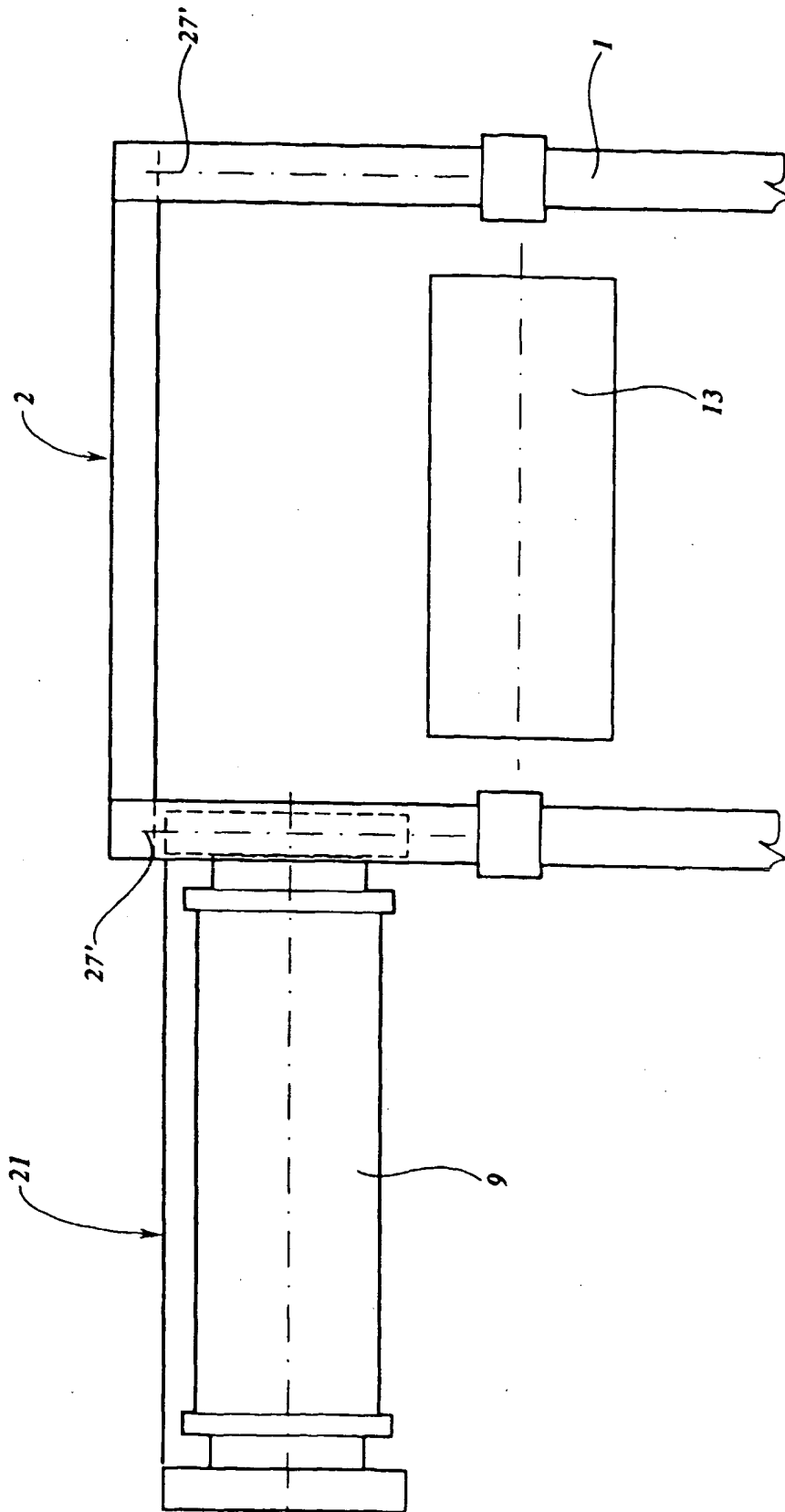


Fig. 8

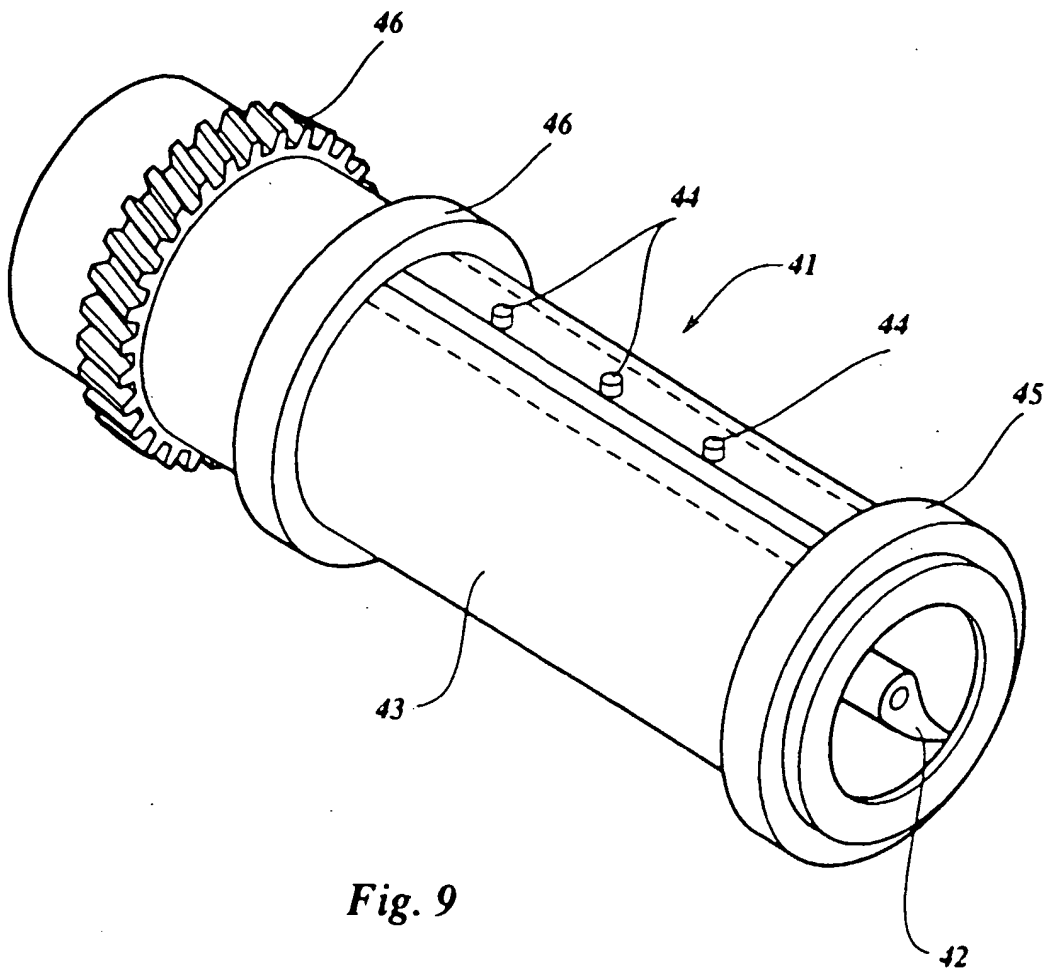


Fig. 9